

Claims

What is claimed is:

1. A condition monitoring system for detecting an overheat condition in a hydrogen-cooled electric generator, comprising:

a generator housing for containing hydrogen within said electric generator, said housing having an access opening with an access flange; and

a flange-mountable condition monitor comprising a hydrogen-side component and an air-side component separated by a barrier wall having a hermetically-sealed throughway for passing electrical conductors from said hydrogen-side component to said air-side component;

wherein said hydrogen-side component comprising a detector means for detecting sub-micron particles in said hydrogen indicative of said overheat condition; and

said air-side component comprising an input/output means for receiving signals from said detector means and for transmitting said signals to a remote location, and a monitor housing for enclosing said input/output means.

2. The condition monitoring system of claim 1 wherein said detector means comprises an ion chamber detector.

3. The condition monitoring system of claim 2 wherein said detector means includes an inlet filter for filtering contaminants larger than said sub-micron particles from said hydrogen before entering said detector means.

4. The condition monitoring system of claim 3 wherein said detector means further comprises an outlet comprising a conduit for conducting hydrogen to a low pressure region in said generator housing.

5. The condition monitoring system of claim 4 wherein said input/output means includes means for processing said signals received from said detector means and for providing an alarm signal to said remote location.

6. The condition monitoring system of claim 5 further comprising a closed-loop flow control connected inline with said detector for maintaining a substantially constant flow through said detector.

7. A flange-mountable condition monitor for detecting an overheat condition in a hydrogen-cooled electric generator, comprising:

a mounting flange adapted to abut and connect to an access flange of said electric generator; and

a hydrogen-side component and an air-side component separated by a barrier wall having a hermetically-sealed throughway for passing electrical conductors from said hydrogen-side component to said air-side component;

wherein said hydrogen-side component comprising a detector means for detecting sub-micron particles in said hydrogen indicative of said overheat condition; and

said air-side component comprising an input/output means for receiving signals from said detector means and for transmitting said signals to a remote location, and a monitor housing for enclosing said input/output means.

8. The flange-mountable condition monitor of claim 7 wherein said detector means comprises an ion chamber detector.

9. The flange-mountable condition monitor of claim 8 wherein said detector means includes an inlet filter for filtering contaminants larger than said sub-micron particles from said hydrogen before entering said detector means.

10. The flange-mountable condition monitor of claim 9 wherein detector means further comprises an outlet comprising a conduit for conducting hydrogen to a low pressure region in said generator housing.

11. The flange-mountable condition monitor of claim 10 wherein said input/output means includes means for processing said signals received from said detector means and for providing an alarm signal to said remote location.

12. The flange-mountable condition monitor of claim 11 wherein said electrical conductors comprise copper wires.

13. A condition monitoring system for detecting an overheat condition in a hydrogen-cooled electric generator, comprising:

a mounting flange adapted to abut and connect to an access flange of said electric generator; and

a flange-mountable condition monitor comprising a hydrogen-side component and an air-side component separated by a barrier wall having a hermetically-sealed throughway for passing electrical conductors from said hydrogen-side component to said air-side component;

said hydrogen-side component comprising a detector for detecting sub-micron particles in said hydrogen indicative of said overheat condition; and

said air-side component comprising an input/output circuit for receiving signals from said detector and for transmitting said signals to a remote location, and a monitor housing for enclosing said input/output device.

14. The condition monitoring system of claim 13 wherein said detector comprises an ion chamber detector.

15. The condition monitoring system of claim 14 wherein said detector includes an inlet filter for filtering contaminants larger than said sub-micron particles from said hydrogen before entering said detector.

16. The condition monitoring system of claim 15 wherein said detector further comprises an outlet comprising a conduit for conducting hydrogen to a low pressure region in said generator housing.

17. The condition monitoring system of claim 16 wherein said input/output circuit includes means for processing said signals received from said detector means and for providing an alarm signal to said remote location.

18. The condition monitoring system of claim 13 wherein said access flange is located on a hydrogen shell of said electric generator.

19. The condition monitoring system of claim 13 wherein said access flange is located on a hydrogen dryer of said electric generator.

20. The condition monitoring system of claim 13 wherein said access flange is located on a hydrogen cooler of said electric generator.

21. The condition monitoring system of claim 14 further comprising a closed-loop flow control connected inline with said ion chamber detector for maintaining a substantially constant flow through said ion chamber detector.

22. The condition monitoring system of claim 13 further comprising means for injecting test particulates into a stream of hydrogen entering said detector means for testing the operation of said condition monitoring system.